PATENT APPLICATION
Q62599

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

HIRATA, MOTOYUKI, et al.

Divisional of
Appln. No.: 09/014,572 Group Art Unit: 1734 (in parent)

Confirmation No.: not yet assigned Examiner: not yet known

Filed: February 5, 2001

For: METHOD FOR MANUFACTURING SOLID POLYMER ELECTROLYTE/ELECTRODE COMPOSITES, BATTERY PRODUCED USING THE METHOD AND METHOD FOR PRODUCING THE SAME

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Page 1, insert the following paragraph before the first line:

This is a Divisional of Application No. 09/014,572 filed January 28, 1998, the disclosure of which is incorporated herein by reference.

Page 15, please delete the second full paragraph and replace it with the following new paragraph:

The laminate film for use in the present invention is obtained by laminating the above-described SPE or pre-SPE film on a film base material. The SPE is laminated by a known coating method such as a doctor knife method and then polymerized to cure by thermal polymerization or the like. Use of a thin film such as a metal or metal oxide

formed by vapor deposition on the surface of the film base material is preferred in view of wettability and peelability. The SPE film of the laminate film usually has a thickness of from 1 to 1,000 μm, preferably from 1 to 300 μm, more preferably from 1 to 50 μm.

Page 16, please delete the first full paragraph, and replace it with the following new paragraph:

The battery of the present invention is obtained by impregnating the solid polymer electrolyte film/electrode composite fabricated according to the above-described method with an electrolytic solution under reduced pressure.

IN THE CLAIMS:

Please cancel claims 1-16 without prejudice or disclaimer.

Please enter the following amended claims.

17. (Amended) A battery obtained by a method comprising the steps of:

a) providing a composite of a solid polymer electrolyte film and a thin film-shaped porous electrode obtained by a method comprising the steps of:

i) providing said solid polymer electrolyte film;

ii) providing said porous electrode comprising an electrochemically active substance;

iii) contacting said solid polymer electrolyte film with said porous electrode; and

iv) reducing pressure inside said porous electrode to fix said solid polymer electrolyte film to said porous electrode;

b) impregnating said porous electrode in said composite under reduced pressure with an electrolytic solution.

Please add the following new claims.

18. (New) A battery obtained by a method comprising the steps of:

a) providing a composite of a solid polymer electrolyte film and a thin film-shaped porous electrode obtained by a method comprising the steps of:

i) coating on an electrode surface of said thin film-shaped porous electrode with a polymerizable compound which is converted to said solid polymer electrolyte or a pre-solid polymer electrolyte upon polymerization; and

ii) reducing pressure inside said porous electrode after superposing said electrode surface coated with said polymerization compound onto said solid polymer electrolyte film,

b) impregnating said porous electrode in said composite under reduced pressure with an electrolytic solution.

19. (New) The battery as claimed in claim 17, wherein said solid polymer electrolyte film of said composite is obtained by polymerizing a composition comprising a solvent having dissolved therein a polymerizable compound.

20. (New) The battery as claimed in claim 18, wherein said solid polymer electrolyte film of said composite is obtained by polymerizing a composition comprising a solvent having dissolved therein a polymerizable compound.

21. (New) The battery as claimed in claim 17, wherein said polymer electrolyte film has an ion conductivity at room temperature of 10^{-5} S/cm or more.

22. (New) The battery as claimed in claim 18, wherein said polymer electrolyte film has an ion conductivity at room temperature of 10^{-5} S/cm or more.

23. (New) The battery as claimed in claim 17, wherein said solid polymer electrolyte film contains a cross-linking polymer having a urethane bond and an oxyalkylene group.

24. (New) The battery as claimed in claim 18, wherein said solid polymer electrolyte film contains a cross-linking polymer having a urethane bond and an oxyalkylene group.

25. (New) The battery as claimed in claim 18, wherein said polymerizable compound coated on said porous electrode has a urethane bond and an oxyalkylene group.

26. (New) A battery according to claim 19, wherein said solid polymer electrolyte film contains no electrolyte salt.

27. (New) A battery according to claim 20, wherein said solid polymer electrolyte film contains no electrolyte salt.

28. (New) The battery according to claim 26, wherein said electrolytic solution comprises a polymerizable compound and an electrolyte salt and said polymerizable compound is polymerized to cure after impregnation under reduced pressure.

29. (New) The battery according to claim 27, wherein said electrolytic solution comprises a polymerizable compound and an electrolyte salt and said polymerizable compound is polymerized to cure after impregnation under reduced pressure.

30. (New) A battery obtained by a method comprising the steps of:

a) providing a composite of a solid polymer electrolyte film and a thin film-porous electrode obtained by a method comprising the steps of:

i) providing said solid polymer electrolyte film;

ii) providing said porous electrode comprising an electrochemically

active substance;

iii) contacting said solid polymer electrolyte film with said porous electrode; and

iv) reducing pressure inside said porous electrode to fix said solid polymer electrolyte film to said porous electrode;

b) impregnating said porous electrode of said composite with an electrolytic solution which has a concentration of an electrolyte salt greater than a concentration at which the electrolytic solution has a maximum ion conductivity,

wherein said solid polymer electrolyte film of said composite is obtained by polymerizing a composition comprising a solvent having dissolved therein a polymerizable compound.

31. (New) A battery obtained by a method comprising the steps of:

a) providing a composite of a solid polymer electrolyte film and a thin film-porous electrode obtained by a method comprising the steps of:

i) coating on an electrode surface of said porous electrode with a polymerizable compound which is converted to said solid polymer electrolyte or a pre-solid polymer electrolyte upon polymerization; and

ii) reducing pressure inside said porous electrode after superposing said electrode surface coated with said polymerization compound onto said solid polymer electrolyte film;

b) impregnating said porous electrode of said composite with an electrolytic solution which has a concentration of an electrolyte salt greater than a concentration at which the electrolytic solution has a maximum ion conductivity,

wherein said solid polymer electrolyte film of said composite is obtained by polymerizing a composition comprising a solvent having dissolved therein a polymerizable compound.

32. (New) The battery according to claim 30, wherein said electrolytic solution comprises a polymerizable compound and an electrolyte salt and said polymerizable compound is polymerized to cure after impregnation under reduced pressure.

33. (New) The battery according to claim 31, wherein the electrolytic solution comprises a polymerizable compound and an electrolyte salt and the polymerizable compound is polymerized to cure after the impregnation under reduced pressure.

REMARKS

Applicants have amended claim 17 to place claim 17 in independent form. Support for new claims 18-33 can be found, for example, on pages 4-8 and page 16 of the present specification.

Entry and consideration of the above changes is respectfully requested.

Respectfully submitted,

Bruce E. Kramer
Registration No. 33,725

SUGHRUE, MION, ZINN,
MACPEAK & SEAS, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Date: February 5, 2001

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is **changed** as follows:

On page 1, insert before the first line the sentence:

--This is a Divisional of Application No. 09/014,572 filed January 28, 1998, the disclosure of which is incorporated herein by reference.--

Page 15, second full paragraph:

The laminate film for use in the present invention is obtained by laminating the above-described SPE or pre-SPE film on a film base material. The SPE is laminated by a known coating method such as a doctor knife method and then polymerized to cure by thermal polymerization or the like. Use of a thin film such as a metal or metal oxide formed by [as] vapor deposition on the surface of the film base material is preferred in view of wettability and peelability. The SPE film of the laminate film usually has a thickness of from 1 to 1,000 μm, preferably from 1 to 300 μm, more preferably from 1 to 50 μm.

Page 16, the first full paragraph:

The battery of the present invention is obtained by impregnating the solid polymer [elecrtolyte] electrolyte film/electrode composite fabricated according to the above-described method with an electrolytic solution under reduced pressure.

IN THE CLAIMS:

The claims are **amended** as follows.

17. (Amended) A battery obtained by [the] a method [as claimed in any one of claims 11 to 16] comprising the steps of:

a) providing a composite of a solid polymer electrolyte film and a thin film-shaped porous electrode obtained by a method comprising the steps of:

i) providing said solid polymer electrolyte film;

ii) providing said porous electrode comprising an electrochemically active substance;

iii) contacting said solid polymer electrolyte film with said porous electrode; and

iv) reducing pressure inside said porous electrode to fix said solid polymer electrolyte film to said porous electrode;

b) impregnating said porous electrode in said composite under reduced pressure with an electrolytic solution.

Claims 18-33 are added as new claims.